Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 7, Number 4 Fall 1999

LATEST DEVELOPMENTS IN THE FIELD OF FERROELECTRIC LIQUID CRYSTALS

Just two months ago from the publication of this issue, a quarter of a thousand scientists, representing academia as well as industry and hailing from 28 different countries, met from Sunday, 29 August, to Friday, 3 September 1999, at the University of Technology in Darmstadt, Germany, to compose a vivid picture of the state of the art in the field of ferroelectric liquid crystals.

As you can see from the list of papers presented at the conference (see pages 4 to 14), the scope of topics spanned a wide range from research on fundamental physics to new applications.

An interesting feature, possibly worthy of imitation, were the poster presentations that outnumbered oral presentations 150 to 71. They informed conference participants of the most recent results in the application, chemistry, physics (by far the largest segment), and theory of ferroelectric and antiferroelectric liquid crystals. And what is probably crucial to in-depth exchange of information, the posters were on display during the entire duration of the conference.

As an overture to the conference early Sunday afternoon, four tutorials covering the fundamentals of chemistry, characterization, models, and dielectric investigations were held consecutively and attracted a sizeable contingent of scientists. The postlude, wrapping up the meeting on Friday at 11:00 am, was a panel discussion on the status and future of display technologies based on ferroelectric liquid crystals, moderated by Professor D.M. Walba.

The social events connected with the conference were also multifaceted, such as sightseeing tours to historical places (Heidelberg with its famous castle, the medieval monastery in Lorsch, the Romanesque cathedral of Speyer) and visits to the European Meteorological Satellite Center, the European Space Agency, and the Society for Heavy Ion Research.

Kudos to Professor Wolfgang Haase and his helpers for not only organizing a highly informative and smoothly running meeting but also providing for our readers the conference report and list of oral and poster presentations in such a timely fashion.

Rudolf Panholzer
Editor-in-Chief

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CONFERENCE REPORT

7TH INTERNATIONAL CONFERENCE ON FERROELECTRIC LIQUID CRYSTALS (FLC 99)

The International Conference on Ferroelectric Liquid Crystals is a series of biannual meetings, first held at Arcachon, France, in 1985. The seventh meeting of the conference was held this year from 29 August to 3 September at the Darmstadt University of Technology, Germany.

It was organized by the Condensed Matter Group of the Institute of Physical Chemistry with the support of members of the Institute of Applied Physics and chaired by Professor W. Haase.

The meeting was attended by about 250 scientists from academia as well a industry, coming from 28 different countries. All in all, the presentations gave an excellent overview of the current state of ferroelectric liquid crystal research, ranging from fundamental physics to novel applications at a high scientific level.

Scientific Program
General topics of the conference were the physics, chemistry, and applications of ferroelectric and antiferroelectric liquid crystals, which were discovered in 1975 and 1989, respectively. These are exhibited by tilted smectic phases, usually comprised of chiral-molecules, and have promising advantages over today's nematic liquid crystal displays (LCD) as there are strongly increased switching speed and excellent contrast.

Technological problems involving the generation of grey scales and mechanical stability of Ferroelectric Liquid Crystal Displays (FLCD) seem to have been solved as evidenced by several prototype demonstrations from different companies. These demonstrations showed outstanding qualities with respect to viewing angle, contrast, brilliance of color, and image stability. Switching properties of FLCs in the microsecond range also allow for nondisplay applications as fast optical switches and shutters, electrically addressed light modulators or dynamic holography.

Oral Presentations
The 71 oral presentations were organized in several groups such as physics, chemistry, theory, and applications of ferroelectric liquid crystals, new effects, structures and phases, banana-shaped FLCs, TGB phases and lyotropics, elastomers, gels, and polymers.

Microsymposia
Specialized presentations were given in three parallel held microsymposia on flexoelectric polarization, special relaxation processes, and nondisplay applications of ferroelectric and antiferroelectric liquid crystals.

Scientific Discussions
Scientific discussions were strongly focused on the origin of ferroelectricity, especially the occurrence of ferro- and antiferroelectricity in achiral phases as well as thresholdless switching in antiferroelectrics, the so-called V-shaped switching.

Prototype demonstrations from different companies showed outstanding qualities with respect to viewing angle, contrast, brilliance of color, and image stability.

Poster Sessions
The scientific program was rounded out by more than 150 posters, on display during the entire time of the conference, presenting most recent results.

Tutorial Sessions
Four tutorial sessions, held in the afternoon of Sunday, 29 August, were very well attended. The topics were:

- Chemistry of ferroelectric and antiferroelectric liquid crystals, given by J. W. Goodby
- Characterization of ferroelectric liquid crystals by different physical methods, given by H. Takezoe
- Models for ferroelectric and antiferroelectric liquid crystals, given by B. Zeks
- Dielectric investigations on ferroelectric and antiferroelectric liquid crystals, given by S. Wróbel.

The conference was concluded by a panel discussion on

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the status and future of display technologies based on ferroelectric liquid crystals.

The strong interest of industry in the 7th International Conference on Ferroelectric Liquid Crystals was not only documented by the demonstrations and exhibitions of display applications and related devices, but also by the financial support and sponsoring of the meeting by academia and industry. The engagement of the Deutsche Forschungsgemeinschaft (German Science Foundation), the Fond der Chemischen Industrie (Foundation of the Chemical Industry), the Hessische Technologiestiftung (Hessen Foundation for Technology), the city of Darmstadt, and the Darmstadt University of Technology, among many others, is gratefully acknowledged.

Social Program

Besides the scientific program, conference attendees were invited to participate in a number of social events such as the conference excursion, offering a sight-seeing tour through Heidelberg, including a visit of the famous castle; or alternatively, a visit of the medieval monastery in Lorsch and the cathedral of Speyer; or visits to EUMETSAT (European Meteorological Satellite Center), ESOC (European Space Agency), and GSI (Gesellschaft für Schwerionenforschung – Society for Heavy Ion Research); as well a city tour of Darmstadt.

Seventy-one oral presentations were organized in several groups such as physics, chemisty, theory, and applications of ferroelectric liquid crystals, new effects, stuctures and phases, banana-shaped FLCs, TGB phases and lyotropics, elastomers, gels, and polymers.

All in all, the meeting was well received by its participants.

The next FLC conference will be held in 2001 in Washington, DC, USA.

Professor Dr. Wolfgang Haase
Dozent Dr. Ingo Dierking
Technische Universität Darmstadt
Institut für Physikalische Chemie
Darmstadt, Germany

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7TH INTERNATIONAL CONFERENCE ON FERROELECTRIC LIQUID CRYSTALS (FLC 99)

The Seventh International Conference on Feroelectric Liquid Crystals took place from 29 August to 3 September 1999 at the Darmstadt University of Technology in Germany. The following is a list of topics and authors of the oral and poster presentations given at the conference. The proceedings of the conference will be published in special volumes of **Ferroelectrics.**

TUTORIALS

Chemistry of ferroelectric and antiferroelectric liquid crystals
J. W. Goodby

Characterization of ferroelectric liquid crystals by different physical methods
H. Takezoe

Models for ferroelectric and antiferroelectric liquid crystals
B. Zeks

Dielectric investigations on ferroelectric and antiferroelectric liquid crystals
S. Wróbel

Microsymposium I:

LONGITUDINAL AND FLEXOELECTRIC POLARIZATION

Spontaneous symmetry breaking leading to splay domains and longitudinal ferroelectricity in achiral freely suspended liquid crystal films
Pang, J., Link, D.R., Jiang, Q., Maclennan, J.E., Clark, N.A.

Longitudinal and transverse ferroelectric polarization in thin chiral and achiral smectic films
Andreeva, P.O., Dolganov, V.K., Gors, C., Fouret, R., Kats, E.I.

Competition between ferroelectric and flexoelectric polarization in freely suspended smectic films
Schlauf, D., Bahr, Ch., Dolganov, V.K., Goodby, J. W.

Large tilt changes as origin of flexoelectrically induced polarization within a discrete phenomenological model of polar smectic liquid crystals
Cepic, M., Rovöek, B., Zekö, B.

Longitudinal polarization in freely suspended liqud crystal films.
Mclennan, J.E., Link, D.R.,Clark, N.A.

Microsymposium II:

SPECIAL RELAXATION PROCESSES IN FLCS AND AFLCS

Dielectric spectroscopy study of the transition into the hexatic phase in chiral smectics
Glogarov·, M., Pociecha, D., Gorecka, E., Rychetsk, I., Mieczkowski, J.

Low frequency relaxations in surface stabilized ferroelectric liquid crystals: Tikhonov regularization analysis
Wang, J.-M., Kim, J.-J.

Nonlinear dielectric relaxation spectroscopy of ferroelectric liquid crystals in the Sm C* phase
Kimura, Y., Hayakawa, R.

Determination of biaxial permittivities and elastic constants of ferroelectric liquid crystals under applied DC field
Brown, C.V., Jones, J.C.

Antiferroelectric liquid crystals studied by complementary methods
Fafara, A., Marzec, M., Haase,W., Wróbel, S., Kilian, D., Godlewska, M., Czuprynski, K., Dabrowski, R.

The relaxation phenomena in antiferroelectric liquid crystals
Panarin, Yu.P., Kalinovskaya, O.E., Vij, J.K

Microsymposium III:

NONDISPLAY APPLICATIONS OF FLCS

FLCs used for polarization mode dispersion compensation in optical 10-Gb/s transmission system
Hinz, S., Sandel, D., Yoshida-Dierholf, M., Mirvoda, V., Noe, R., Weyrauch, T., Haase, W.

Electrooptic switching dynamics of FLCs in a planar waveguide for integrated optics
Scalia, G., Hermann, D.S., Abbate, G., Lindgren, M.

Beam deflector using double-refraction in ferroelectric liquid crystal waveguides
Gros, E., Dupont, L.

High frequency and high voltage mode of deformed helix ferroelectric liquid crystals in a broad temperature range

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Pozhidaev, E.P., Pikin, S.A., Ganzke, D., Shevtchenko, S., Haase, W.

Reflective FLC OASLMs with dielectric mirrors
Onokhov, A.P., Beresnev, L.A., Isaev, M.V., Feoktistov, N.A., Konshina, E.A., Chaika, A.N., Ivanova, N.L.

2D random addressed liquid crystal spatial light molulators for intracavity laser beam steering
Soms, L., Beresnev, L.A., Isaev, M., Kornev, A., Onokhov, A., Pokrovskiy, V., Stoupnikov, V.

Liquid crystal devices as holographic elements for polychrome correction of telescope lens distortions
Berenberg, V.A., Leshchev, A.A., Vasil'ev, M.V., Venediktov, V.Yu., Haase, W., Onokhov, A.P., Beresnev, L.A.

GENERAL

Fluid biaxial banana phases: Applications from symmetry considerations
Cladis, P.E., Pleiner, H., Brand, H.R.

Deuteron NMR of ferroelectric and antiferooelectric liquid crystals
Blinc, R., Zalar, B., Gregorovi, A., Simsi, M., Zidanaek, A., Neubert, M.

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Ferroelectric liquid crystals induced by atropoisomeric dopants: Probing the origin of polarization amplification in phenylpyrimidine hosts
Vizitiu, D., Lazar, C., Lemieux, R.P.

Photo-flexoelectric and photo-ferroelectric effects caused by banana-shape photo-isomers in nematic and ferroelectric liquid crystals
Blinov, L.M., Kozlovsky, M.V., Ozaki, M., Yoshino, K., Haase, W.

Photo-aligned orientation layers for ferroelectric LCDs
Fünfschilling, J., Stadler, M., Schadt, M.

CHEMISTRY

Liquid crystals with fluorinated terminal chains and antiferroelectric properties
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The synthesis and properties of host materials with fluoro substituents in the core and in a terminal chain for high dielectric biaxiality FLC mixtures
Goodby, J.W., Hird, M., Jones, J.C., Lewis, R.A., Sage, I.C., Toyne, K.

Synthesis of a series of novel mesogen-functionalized dendritic macromolecules showing ferroelectricity
Busson, P., Örtegren, J., Gedde, U.W., Hult, A.

New antiferroelectric achiral mesogenic mixtures of polymer-monomers and their pyroelectric characterization
Soto Bustamante, E.A., Yablonskii, S.V., Weyrauch, T.

Ferroelectric steroidal liquid crystals based on fluorocarbon chains
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Polar switching in discotic lyomesophases
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Organosiloxanes: A new route to control ferroelectricity and antiferroelectricity in liquid crystals using the same mesogen
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Fast switching by electrically commanded surfaces (ECS)
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Ferroelectric liquid crystalline elastomers: F rom the analysis of the molecular dynamics to the design of nanomachines
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Antiferroelectric liquid crystal gels
de la Fuente, M.R., Martin, E., Perez Jubindo, M.A., Artal, C., Ros, B., Serrano, J.L.

Light modulation characteristics of single-polarizer PDFLC cells
Zyryanov, V.A., Smorgon, S.L., Barannik, A.V., Pozhidaev, E.P., Andreev, A.L., Kompanets, I.N., Haase, W., Weyrauch, T.

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Molecular design and mesomorphic

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Bedel, J.P., Achard, M.F., Laguerre, M., Rouillon, J.C., Marcerou, J.P., Nguyen, H.T.

A stable ferroelectric smectic C phase composed of racemic molecules
Walba, D.M., Körblova, E., Shao, R., Maclenan, J.E., Link, D.R., Clark, N.A.

Novel antiferroelectric banana-shaped liquid crystals without Schiff's base units
Shen, D., Tschierske, C., Diele, S., Wirth, I.

Spontaneous formation of double-twisted helix in a banana-shaped liquid crystal
Chien, L.-C., Lee, C.-K., Bai, F., Li, Y., Cheng, S.Z.D., Petschek, R.

Nonlinear boomerang-shaped liquid crystals derived from 2,5-bis (p-hydroxyphenyl)-1,3,4-oxadiazole
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Conformational transitions of smectic phases formed by achiral bent-core molecules
Jakli, A., Lischka, Ch., Weissflog, W., Pelzl, G., Rauch, S., Heppke, G.

Antiferroelectric properties and helical superstructures of mesophases formed by bent molecules
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Evidence of columnar structure in compounds composed of banana-shaped molecules
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Structure of chiral smectic-C mesophases revealed by polarization-analyzed resonant X-ray scattering
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Theoretical analysis of the resonant X-ray scattering on the ferro-, antiferro- and ferrielectric phases of chiral smectic liquid crystals
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X-ray reflectivity study of the thin films of chiral and nonchiral antiferroelectrics
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Critical behavior of birefringence in the smectic-A phase of chiral smectics
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FLC materials optimized for high resolution magnified view and projection applications
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Printed FLCDs on plastic stubstrates
Frey, V., Randler, M., Lueder, E., Muecke, M., Brill, J., Frohna, M.

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Phase modulating spatial light modulator using ferroelectric liquid crystals and their application
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The balance between ferroelectric and antiferroelectric order - surface-stabilized thermodynamic phases
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Electrooptical properties of thresholdless antiferroelectric liquid crystals and their application to high resolution TFT-LCD
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Properties of ferroelectric phases determined using dielectric spectroscopy, infrared polarization spectroscopy, pyroelectrics, polarization and electrooptics
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V-shaped switching in smectic-C*-like liquid crystals: Physics and application
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Dynamics of the smectic layer directional instability
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Influence of boundary condition of electrical and optical properties of ferroelectric liquid crystals
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Computer simulations of liquid crystal mesophases investigating a generalized molecular asymmetry model
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Van der Waals pair interactions as an origin of chiral superstructures in achiral polar smectic liquid crystals
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Molecular origin of tilt in electroclinic liquid crystals
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Polarity, spontaneous polarization and propagation of tilt in smectics
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Molecular origins of anticlinic ordering in tilted smectics
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Molecular origin of ferroelectric and antiferroelectric ordering in chiral and nonchiral smectics
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Gray levels in FLC based on static threshold
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Phase modulation capability of deformed helix ferroelectric liquid crystals
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Liquid crystal confined mode fibre based devices: Technology and potential applications
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Temperature dependence of practical t-V mode FLC materials
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Towards low birefringent achiral smectic C hosts for new display applications
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Continuous gray scale of passively addressed FLC display cells
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Antiferroelectric liquid crystal display with one polarizer in a reflective configuration
You, D.-H., Lee, J.-H., Lee, S.-D., Park, S.-S.

Truly tristable devices with antiferroelectric V-shape molecule material
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Asymmetric switching and storage effects in feroelectric gels and polymers
Kitzerow, H.-S., Röder, T., Strauss, J.

Spontaneous layer reorientation in smectic C liquid crystals
Lymer, K.P., Jones, J.C., Dunn, P.E., Richardson, R.M., Taylor, L.

The physics of tV_{MIN} ferroelectric liquid crystal displays
Jones, J.C., Brown, C.V., Dunn, P.E., Hughes, J.R., Lymer, K.P., Koden, M.

Fast switching electronic mixtures based on a series of chloroester homologues
Xu, H., Davey, A.B., Wilkinson, T.D., Crossland, R.M.

X-ray studies of needle defects (the stripe texture) in the initial alignment state of high and low pre-tilt SSFLC devices
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Main-chain ferroelectric liquid crystal polymers for second order nonlinear optics applications
Walba, D.M., Xiao, L., Shao, R., Clark, N.A., Keller, P.

Effects of phase coexistence on the electrooptic response in the antiferroelectric SmC*a phase in materials exhibiting thresholdless switching in the smectic C* phase
Rudquist, P., Krüerke, D., Lagerwall, J.P.F., Lagerwall, S.T., Clark, N.A., Maclennan, J.E., Walba, D.M.

Light-controlled electrooptic response in a chiral smectic with sign reversal of the spontaneous or induced polarization
Komitov, L., Ichimura, K.

PTFE alignment of surface-stabilized FLC and AFLC materials
Quintana, X. Otón, J.M., Brunet, M., Lotoux, R.

Addressing waveforms for tristable AFLCs in active matrix displays
Quintana, X., Gayo, J.L., Rodrigo, C., Urruchi, V., Otón, J.M.

Design and application of liquid crystal spatial light modulators in Jenotiks optical signal processing systems
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New chiral LC acrylates: Polar ordering in crystalline and smectic phases
Konstantinov, I.I., Yablonskii, S.V., Alexandrov, A.I., Magagnini, P.L.

A novel type of crystalline dimers by linking two banana-shaped mesogens
Dehne, H., Pötter, M., Kleist, M., Reinke, H., Weissflog, W., Diele, S., Pelzl, G., Wirth, I., Grande, S.

Racemic liquid crystals with an anticlinic smectic C structure
Parghi, D.D., Baylis, L., Gleeson, H.F., Kelly, S.M., Goodby, J.W.

Achiral liquid crystals with an anticlinic smectic C structure
Parghi, D.D., Kelly, S.M., Goodby. J.W.

A laterally fluoro-substituted banana-shaped liquid crystal showing antiferroelectricity
Heppke, G., Parghi, D.D., Sawade, H.

New IR, 4R-methan-3-one derivatives as chiral components of induced ferroelectrics
Pivnenko, M.N., Vashchenko, V.V., Petrenko, A.S., Krivoshey, A.I., Kutulya, L.A., Goodby, J.W.

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New series of chiral smectic chlorinated liquid crystals
Bubnov, A.M., Hamplová, V., Kapar, M., Glogarová, M., Vanek, P.

Cyanohydron-containing side-chain ferroelectric liquid crystalline copolymers
Chien, L.-C., Walz, A.J., Shenouda, I.G.

Formation of double-twisted helix in isoregic chiral smectic polyester
Chien, L.-C., Bai, F., Li, Y., Cheng, S.Z.D., Petschek, R.

Ferroelectric liquid crystalline phase exhibited by biphenyl resorcylate and vanillate derivatives
Shivkumar, B., Sadahiva, B.K., Krishnaprasad, S., Shivkumar, U., Lee, J.C.

Twist grain boundary A phase in [R]-[-]-1]methylheptyl-4'-(3''-chloro-4''-n-alkoxybenzoyloxy)-biphenyl-4-carboxylates
Kasthuraiah, N., Sadashiva, B.K., Nguyen, H.T., Rouillon, J.C., Isaert, N.

Influence of the electric field on phase transition sequences of chiral smectics
Sarmento, S., Simeao Carvalho, P., Carvalho, P.S., Chaves, M.R., Nguyen, H.T.

New synthesis and smectic C phase formation in liquid crystalline biphenyls, terphenyls, and quaterphenyls
Bezborodov, V.S., Lapanik,V.I., Sasnouski, G.M.

Novel 2',3',3'-trifluoroterphenyls for high dielectric biaxiality achiral host mixtures for ferroelectric display devices
Goodby, J.W., Gough, N., Hird, M., Jones, J.C., Minte, V.

Novel materials possessing a high smectic C phase stability
Gough, N., Hird, M.

The synthesis and characterization of a novel antiferroelectric material possessing a 2,3,4-trifluorophenyl core
Goodby, J.W., Gough, N., Hird, M., Parghi, D.D.

The synthesis of novel polyoxetanes with broad smectic C phases and an electrooptical study of the precursor oxetane monomers
Cowling, S.J., Toyne, K.J., Goodby, J.W.

New ferroelectric liquid crystalline dendrimers
Zhu, X., Vinokur, R.A., Boiko, N.I., Rebrov, E.A., Muzafarov, A.M., Shibaev, V.P.

Molecular design, mesomorphic properties and electrooptic behavior of new achiral dimesogen series
Bedel, J.P., Acgard, M.F., Laguerre, M., Rouillon, J.C., Marcerou, J.P., Nguyen, H.T.

Synthesis and properties of perfluoroalkylated bent-core liquid crystals
Kovalenko, L., Weissflog, W., Lose, D., Diele, S., Pelzl, G., Grande, S., Schmalfuss, H., Kresse, H.

Novel fluorinated ferroelectric and antiferroelectric organisiloxane liquid crystals
Perkins, S.P., Lehmann, P., Robinson, W.K., Shoosmith, D.E., Coles, H.J.

Ferroelectric liquid crystal elastomers
Gebhard, G., Tolksdorf, C., Zentel, R.

Searching for S_C* and S_{CA} phases in side chain liquid crystalline polyoxetanes by means of changes on a flexible spacer between two mesogens
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Frustrated phase condition: A way to room temperature FLC polymers with low switching voltage?
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Polarization measurements reflecting the effect of polymer networks on phase symmety of a chiral liquid crystal
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A synchrotron X-ray study of the smectic layer directional stability
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Saturation voltage and elastic energy of polymer dispersed ferroelectric liquid crystal films
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Polarized FT-IR study on $SmC_ß$* of AFLCs and SmC* of FLCs
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SmC_a* domains in $SmC_ß$* phase of antiferroelectric liquid crystals
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Electronic electooptic study in photopolymers derived from ferroelectric liquid crystals
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MRS ANNOUNCES NEW EDITION TO SERIES ON FERROELECTRIC THIN FILMS

The newest volume in a popular series from the Materials Research Society (MRS), ***Ferroelectric Thin Films VII***, documents symposium reports from the 1998 MRS Fall Meeting in Boston, MA, and contains 113 papers, 770 pages.

This volume, the seventh in the series, presents the latest technical information on ferroelectric thin films from an international array of academia, government organizations, and industry. Recent results in DRAM and FERAM devices, as well as enhancements in materials performance for these applications are reported. Advances in integration issues are also discussed, including new electrode technologies, annealing procedures, and fabrication methods. The development of ferroelectric thin films for piezoelectric, pyroelectric, and optical applications is reviewed. And improved film fabrication procedures, including chemical vapor deposition and chemical solution deposition, are featured. Topics include: BST and DRAM; integration and electrodes; bilayered ferroelectrics; Pb-based ferro electrics; fundamental materials properties and superlattices; ferroelectric gate materials and devices, piezoelectric, electrostrictive, pyroelectric, and giant magnetoresistive materials; and ferroelectrics for microwave and optical applications.

Edited by Robert E Jones (Motorola), Robert W,Schwartz (Clemson University), Scott R. Summerfelt (Texas Instruments, Inc.), and In K. Yoo (Samsung Advanced Institute of Technology), ***Ferroelectric Thin Films VII*** [ISBN 1-55899-447-5] is Volume 541 in the MRS Symposium Proceedings Series and is available in hardcover for $78.00 (MRS members), $89.00 (U.S. list), and $98.00 (Non-U.S. list).

For further information, or to place an order, contact the Materials Research Society, Customer Services Department, at 506 Keystone Drive, Warrendale, PA 15086, USA; phone: +724-779-3003; fax: +724-779-8313.

Correct Website for
WORKSHOP ON FUNDAMENTAL PHYSICS OF FERROELECTRICS
to take place on 13-20 February 2000 in Aspen, Colorado, USA:
The correct website is: http://www.gl.ciw.edu/GL-Conferences.html
The email address of Ronald Cohen, organizer, is: cohen@gl.ciw.edu

UPCOMING MEETINGS

13th IEEE International Micro Electro Mechanical Systems Conference (MEMS-2000)
23 -27 January 2000
World Convention Center SUMMIT, Miyazaki, Japan

Sponsored by the IEEE Robotics and Automation Society and the Micromachine Center, MEMS-2000 is one of the most exciting meetings focusing on interdisciplinary research topics on micro electro mechanical devices and systems fabricated on the micrometer to millimeter scale. MEMS, which emerged in the 1980s, continues to grow. Sensors and actuators as MEMS key components are likely to break new ground in the next decade. In addition, new products are introduced into the market including optical devices and storage devices. MEMS-2000 provides excellent opportunities to get together for discussing the trend of the future and the status of current MEMS.

Topics

Basic Research

- Fabrication Technologies: Bulk and surface micromachining; high aspect ratio microstructures; electroplated microstructures; thin films; lithography; new fabrication methods for microparts
- Assembly and Packaging: Bonding; interconnection; preassembly and self-assembly, MEMS-related packaging for commercial use
- Experiments in Microdomain: Fluid dynamics; electrostatic and electromagnetic fields; microoperation of small objects; testing and characterization of mechanical properties of materials; device performance
- Theory and Simulation: Microrobotics; scaling; device physics; field and system modeling; computation
- Design Tools: CAD/CAM for MEMS fabrication and analysis

Application

- Actuators: New actuation principles; microactuators for small-scale machines; concentrated microactuators for large-scale machines
- Sensors: Devices detecting strain, force, pressure, flow, acceleration, position, temperature, chemicals, etc.; sensing systems such as environmental and intelligent sensors
- System Configurations: Distributed microsystems; integration of microsensors and microactuators; interfacing of MEMS with the external world
- Optical Systems: Microoptics; telecommunication use; measurement systems; devices for the generation, modulation, and detection of light
- Fluidic Systems: Pumps; valves; microchannels; mixers; micro total analysis systems
- Data Storage: Disk storage; new concepts for storage
- Medical Engineering: Surgical and electrical devices; patient monitoring
- Scientific Instruments: Switches and relays; microrobots; process monitoring and control devices

Organizing Committee

General Co-Chairs:
Isao Shimoyama (University of Tokyo); Hiroki Kuwano (NTT)
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IEEE MEMS-2000 Conference, c/o MESAGO Japan Corp., YKB Sunny Bldg. 3F, 4-32-8 Yotsuya, Shinjuku-ku, Tokyo, 160-0004, Japan; phone: +81-3-3359-0894; fax: +81-3-3359-9328
email: mems@mesago-jp.com; website: http://www.mesago-jp.com/mems

UPCOMING MEETINGS

Internationl Conference on Metallurgical Coatings and Thin Films (ICMCTF-2000)
New Horizons Symposium
10 - 14 April 2000
San Diego, California, USA

The intent of this symposium is to focus on emerging thin film technologies that are relevant to ICMCTF, but are not typically covered. The symposium will highlight new developments in the areas covered by each session with an emphasis on new materials and processes, novel applications and current challenges and opportunities. One of the goals of this symposium is to provide a forum for participants in industrial and academic environments for discussing the impact and applications of these emerging thin film technologies or their respective areas. An evening poster session will be held in conjunction with the oral sessions.

Sessions

H1. Magnetic Materials

Session Chair: Steve Bozeman (Seagate)

Recording Heads: The 60 percent compound annual growth rate in storage devices continues to drive the need to develop improved thin film magnetic materials. Papers will describe progress in this area, including thin films for magnetic media and recording heads, applications of CMR/GMR structures, magnetic memories, MMIC devices, thin film magnets, and ferrites.

H2. Novel Materials for MEMS

Session Chairs: Dave Nagel (George Washington University) and John Givens (Thomas West, Inc.)

The design and fabrication of MEMS devices is a multi-billion dollar industry which is expected to double every two to four years. The combination of thin films with MEMS structures offers great opportunities for novel applications and has just begun to be explored. Papers will deal with the development and applications of novel thin film materials combined with MEMS structures, including MEMS for sensor and biomedical applica tions, RF MEMS technologies and issues related to interconnects and packaging of MEMS devices.

H3. Ferroelectric DRAMs

Session Chair: Jim Horwitz (U.S. Naval Research Laboratory)

Thin films of ferroelectric materials have provided numerous novel applications in varied areas such as data storage and high performance RF devices. This session includes topics ranging from novel deposition techniques for ferroelectric thin films to their numerous applications. Papers will deal in the areas of ferroelectric nonvolatile random-access memories, ferroelectric based sensors, frequency agile microwave devices, and piezoelectric actuators.

H4. Novel Materials and Processes

This session will address novel and emerging topics in thin film technologies outside the areas covered by the other sessions on this symposium, such as nonoclusters, sensor coatings, polymer coatings, and novel thin film deposition techniques and processes.

Contact

More information about the conference can be found at the ICMCTF 2000 website:
http://www.vacuum.org/icmctf/icmctf.html

UPCOMING MEETINGS

4th International Symposium on Micro Total Analysis Systems (μTAS 2000)
14 - 18 May 2000
University of Twente in Enschede, The Netherlands

At μTAS 2000, research and development of new technologies, methods and devices, systems aspects and application areas such as clinical diagnostics, point of care testing, drug discovery and process control will be presented. Special attention will be paid to analytical chemical as well as micro- and nanofluidics aspects. The meeting will use a single session workshop format, interspersed with poster sessions. A small-scale, noncommercial exhibition will be organized for institutions and companies interested to present their results in μTAS R&D.

Topics

- Physics of Microfluidics: Fundamentals, simulation, modeling; characterization techniques; fluidic components
- Microfabrication Technology: Plastic technology; new silicon techniques, new materials
- Analytical Chemical Aspects: New analytical methods; fundamentals
- Detectors, Sensors, Arrays: Optical sensing; electrochemical sensing; sensor arrays
- Applications: Diagnostics, drug screening; cell analysis; environmental/process monitoring; combichem
- Systems Aspects: System integration, system concepts
- DNA Analysis: PCR/CE arrays; micromachined tools; optical techniques

Contact

Congress Association Twente, Janny A. Spierenburg, P.O. Box 217, 7500 AE Enschede, The Netherlands
phone: +31-53-489-4444; fax: +31-53-489-4442; email: mutas2000@cat.utwente.nl

Website

http://www.el.utwente.nl/mesa/mutas2000

3rd SIAM Conference on Mathematical Aspects of Materials Science
21 - 24 May 2000
Philadelphia, Pennsylvania, USA

The conference gathers an interdisciplinary community of scientists working on mathematical and computational aspects of materials science. The sessions will provide a forum for development on:

- Analysis of moving interfaces
- Macroscopic consequences of microstructure
- Defects in materials

A second goal is to highlight recent accomplishments in:

- Materials design, synthesis and processing
- Nanoscale structures
- Growth and morphology of thin films
- Electromagnetic materials

A third goal is to identify promising directions for new developments of a mathematical or computational nature in areas such as:

- Multiscale analysis of materials: From atomic to continuum
- Nanoscale structure
- Liquid crystals, glasses and polymers
- Soft materials and biomaterials

UPCOMING MEETINGS

Materials science is an interdisciplinary subject. The conference welcomes scientists and mathematicians from a broad range of backgrounds, including for example, mechanics, physics, engineering, mathematical analysis, computational science, and biology.

Contact

SIAM, 3600 University City Science Center, Philadelphia, PA 19104-2688; phone: +215-382-9800; fax: +215-386-7999; email: meetings@siam.org

Website

http://www.siam.org/meetings/ms00

8th International Meeting on Chemical Sensors
3 - 5 July 2000
Basel, Switzerland

The meeting is an interdisciplinary forum on all aspects – physics, materials science, chemistry, development and applications – of chemical sensors.

Topics

- Sensing principles and mechanisms
- Novel approaches to sensing
- Signal processing
- Electromechanical devices
- Acoustic sensors
- Humidity sensors
- Environmental monitoring
- New materials development
- Sensor fabrication technology
- Optical devices
- Biosensors
- Gas sensors
- Analytical microsystems
- Process control sensing

Proceedings

Authors are invited to submit full papers for inclusion in a special issue of the Elsevier journal ***Sensors and Actuators B: Chemicals*** which will be published after the conference. Acceptance of papers is subject to peer review.

Contact

IMCS 2000 Conference Secretariat, Phillipa Orme, 12 Church Street, West Hanney, Nr. Wantage, Oxon, OX12 0LN, UK
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http://www.elsevier.nl/locate/imcs2000

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Fifth International Symposium on Ferroic Domains and Mesoscopic Structures (ISFD-5)

held at Pennsylvania State University, Pennsylvania, USA
6 -10 April 1998

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CALENDAR OF EVENTS 1999

Nov. 29-Dec. 3	•	MRS 1999 Fall Meeting, Boston, Massachusetts, USA (see *Ferroelectricity Newsletter,* Vol. 7, No. 2, p. 19)

EVENTS IN 2000

Jan 23-27	•	13th IEEE International Micro Electro Mechanical Systems Conference (MEMS-2000), Miyazaki, Japan (see p. 15)
Feb 13-20	•	Workshop on Fundamental Physics of Ferroelectrics, Aspen, Colorado, USA, (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 12)
Mar 12-15	•	12th International Symposium on Integrated Ferroelectrics (ISIF 2000), Aachen, Germany (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 13)
Mar 12-16	•	5th International Conference on Organic Nonlinear Optics (ICONO'5), Davos, Switzerland (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 14)
Apr 10-14	•	International Conference on Metallurgical Coatings and Thin Films (ICMCTF-2000), New Horizons Symposium, San Diego, California, USA (see p. 16)
Apr 12-14	•	Symposium Ferroelectrics UK 2000, Cirencester, UK (Website: http://www.eeie.sbu.ac.uk/congress2000)
Apr 24-28	•	MRS 2000 Spring Meeting, San Francisco, California, USA (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 15)
May 14-18	•	4th International Symposium on Micro Total Analysis Systems (μTAS 2000), Enschede, The Netherlands, (see p. 17)
May 21-24	•	3rd SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, Pennsylvania, USA (see p. 17)
Jul 3-5	•	8th International Meeting on Chemical Sensors, Basel, Switzerland (see p.18)
Aug 27-30	•	5th European Conference on the Application of Polar Dielectrics (ECAPD-5), Jurmala, Latvia (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 17)
Sep 3-6	•	Electroceramics VII, Portoroz, Slovenia (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 18)
Dec 12-15	•	3rd Asian Meeting on Ferroelectrics (AMF-3), Hong Kong, China (see *Ferroelectricity Newsletter,* Vol. 7, No. 3, p. 19)

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